D. Amendments to the Claims

The following is a complete listing of all claims (including claims being currently amended as well as claims not being amended). The status of each claim is indicated in a parenthetical expression after the claim number.

1. (Currently Amended) A method of evaluating a feature in a semiconductor wafer, the method comprising:

illuminating the wafer with a beam of electromagnetic radiation having a majority of energy polarized in a direction, said direction being other than parallel to a longitudinal direction of the feature; and

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measuring intensity of a portion of the beam reflected by the wafer.

2. (Original) The method of Claim 1 wherein:

the feature includes a sidewall of a groove; and

the act of measuring is performed repeatedly at a plurality of locations transverse to the longitudinal direction of the groove.

3. (Original) The method of Claim 2 wherein:

the beam has a wavelength greater than thickness of the sidewall.

4. (Original) The method of Claim 1 wherein:

the beam has a wavelength greater than a dimension of the feature; and

the beam forms on the wafer a spot of a diameter greater than the dimension.

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5. (Original) The method of Claim 1 wherein:

the feature includes a trace of reflective material.

6. (Original) The method of Claim 1 wherein:

the wafer includes a layer located between a source of the beam and the feature; and

the layer is at least partially transmissive, so that the portion passes through the layer.

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7. (Original) The method of Claim 1 wherein:

the beam has a majority of energy polarized in a direction at least substantially perpendicular to the longitudinal direction.

8. (Original) The method of Claim 1 wherein:

the beam has a predetermined wavelength; and

the method further comprises filtering light of a wavelength other than the predetermined wavelength.

9. (Original) The method of Claim 1 wherein the wafer has a plurality of features including the feature, and the method further comprises:

performing the act of measuring for each feature of the plurality; and

comparing measurements of multiple features.

10. (Original) The method of Claim 9 wherein:

each feature is a sidewall; and

the act of comparing includes comparing measurements of two sidewalls located opposite to one another in a groove.

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11. (Original) The method of Claim 1 wherein the beam is a first beam, and the method further comprises:

illuminating the wafer with a second beam of electromagnetic radiation.

12. (Original) The method of Claim 11 wherein:

the first beam forms a first spot on the wafer, the second beam forms a second spot;

the act of measuring includes measuring with the first spot and the second spots located on opposite sides of the feature; and

the method further comprises measuring with the first spot and the second spots located on the same side of the feature.

13. (Original) The method of Claim 11 wherein:

the second spot at least partially overlaps the first spot.

14. (Original) The method of Claim 13 wherein:

the first beam has a first wavelength different from a second wavelength of the second beam;

the second beam is modulated at a predetermined frequency; and

the act of measuring includes measuring intensity of the second beam having the second wavelength and modulated at the predetermined frequency.

15. (Original) The method of Claim 13 wherein:

the first beam is polarized substantially perpendicular to the longitudinal direction.

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16. (Currently Amended) ~~A method of evaluating wafers during fabrication, the method comprising:~~ The method of Claim 1 further comprising:

forming ~~a~~ the feature of conductive material in a the wafer by using at least one process parameter;

~~illuminating the wafer with a beam of electromagnetic radiation having a majority of energy polarized in a direction other than parallel to a longitudinal direction of the feature; and~~

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repeatedly performing said measuring intensity ~~of a portion of the beam reflected by the wafer at a plurality of locations transverse to the longitudinal direction~~; and

changing the process parameter depending on measurements obtained from the act of repeatedly measuring.

17. (Currently Amended) ~~The method of Claim 16 further comprising:~~ A method of evaluating wafers during fabrication, the method comprising:

forming a feature of conductive material in a wafer by using at least one process parameter;

illuminating the wafer with a beam of electromagnetic radiation having a majority of energy polarized in a direction other than parallel to a longitudinal direction of the feature; and

repeatedly measuring intensity of a portion of the beam reflected by the wafer at a plurality of locations transverse to the longitudinal direction;

changing the process parameter depending on measurements obtained from the act of repeatedly measuring;

determining a coefficient of a function that fits the measurements;

comparing the coefficient against a predetermined limit and performing the changing based on an outcome of the comparing.

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Claims 18-28 (canceled).

29. (Currently Amended) An apparatus for evaluating a feature in a wafer, the apparatus comprising:

a laser source for generating a beam polarized in a direction, wherein said direction is other than parallel to a longitudinal direction of the feature; and

a photosensitive element located in a path of radiation of electromagnetic energy from the wafer.

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30. (Original) The apparatus of Claim 29 further comprising:

a circuit coupled to the laser to move the beam along a line across the feature; and

a monitor for displaying a graph of a signal generated by the photosensitive element as a function of distance along the line.

31. (Original) The apparatus of Claim 30 wherein:

the line is at least substantially perpendicular to the longitudinal direction of the feature.

32. (Original) The apparatus of Claim 29 further comprising:

an oscillator capable of oscillating at a frequency lower than 25000 Hz, the oscillator being coupled to the laser source; and

a lock-in amplifier coupled to said oscillator and to said photosensitive element.

33. (Original) The apparatus of Claim 32 wherein during operation:

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said oscillator causes said laser source to generate said beam at an intensity modulated at said frequency; and

said lock-in amplifier generates a signal indicative of reflectivity of said wafer.

34. (Original) The apparatus of Claim 29 further comprising:

a computer coupled to the photosensitive element and programmed to determine a dimension of the feature.

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35. (Original) The apparatus of Claim 34 further comprising:

a memory having encoded therein values generated from at least one test wafer having a feature of a known property;

wherein the computer is programmed to use a signal generated by the photosensitive element to look up a value of property for the wafer, based on the values in memory.

36. (Currently Amended) An apparatus comprising:

means for illuminating a semiconductor wafer with a beam of electromagnetic radiation having a majority of energy polarized in a direction, wherein said direction is other than parallel to a longitudinal direction of the feature; and

means for measuring intensity of a portion of the beam reflected by the wafer, the means for measuring being coupled to the means for illuminating.

37. (Original) The apparatus of Claim 36 further comprising:

means for displaying measurements generated by the means for measuring, as a function of distance.

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Please add the following new claims.

38. (New) The method of Claim 17 wherein:

the feature includes a sidewall of a groove.

39. (New) The method of Claim 38 wherein:

the beam has a wavelength greater than thickness of the sidewall.

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40. (New) The method of Claim 17 wherein:

the beam has a wavelength greater than a dimension of the feature; and

the beam forms on the wafer a spot of a diameter greater than the dimension.

41. (New) The method of Claim 17 wherein:

the feature includes a trace of reflective material.

42. (New) The method of Claim 17 wherein:

the wafer includes a layer located between a source of the beam and the feature; and

the layer is at least partially transmissive, so that the portion passes through the layer.

43. (New) The method of Claim 17 wherein:

the beam has a predetermined wavelength; and

the method further comprises filtering light of a wavelength other than the predetermined wavelength.

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44. (New) The method of Claim 17 wherein the wafer has a plurality of features including the feature, and the method further comprises:

performing the act of measuring for each feature of the plurality; and

comparing measurements of multiple features.

45. (New) The method of Claim 17 wherein the beam is a first beam, and the method further comprises:

illuminating the wafer with a second beam of electromagnetic radiation.

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46. (New) The method of Claim 45 wherein:

the first beam forms a first spot on the wafer, the second beam forms a second spot;

the act of measuring includes measuring with the first spot and the second spots located on opposite sides of the feature; and

the method further comprises measuring with the first spot and the second spots located on the same side of the feature.

47. (New) The method of Claim 46 wherein:

the second spot at least partially overlaps the first spot.

48. (New) A method of evaluating a sidewall of a groove in a semiconductor wafer, the method comprising:

illuminating the wafer with a beam of light polarized in a direction P, said direction P forming an angle θ with a longitudinal direction of the sidewall, with angle $\theta > 45°$, wherein the beam has a wavelength larger than a width of the groove, the sidewall is formed of a conductive material, and a portion of the light polarized perpendicular to the groove is converted into heat and transmitted into a substrate of the semiconductor wafer; and

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measuring intensity of light reflected by the wafer.

49. (New) The method of Claim 48 wherein:

using a measurement obtained from said measuring as an indication of a thickness of the sidewall.

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50. (New) The method of Claim 48 wherein:

with angle θ is approximately 90°.

51. (New) The method of Claim 50 wherein:

said light reflected by the wafer is part of said beam.

52. (New) The method of Claim 50 wherein:

said light reflected by the wafer is part of another beam.

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